## Context of OSE

PolicyEngine is an open-source economic modeling platform that democratizes access to sophisticated policy analysis tools, addressing pressing issues of national and societal importance. Our platform has been recognized by the UN-endorsed Digital Public Goods Alliance (Woodruff 2023) and powers analysis at major institutions like the Niskanen Center (Ghenis & Gross 2024). Our suite of software empowers researchers, policymakers, and the public to analyze complex tax and benefit systems across federal, state, and local levels in the United States, grounding public policy debates in credible data and evidence.

Historically, policy modeling tools have been siloed within government agencies and think tanks, limiting broader participation in policy analysis and debate. PolicyEngine addresses this gap through three core components: a comprehensive tax-benefit rules engine, integrated microdata, and accessible interfaces:

* Our open-source tax-benefit rules engine precisely models intricate policy rules, enabling researchers to accurately calculate historical tax liabilities, benefit eligibility, and marginal tax rates, enriching understanding of national economic trends and policy impacts.
* We apply advanced data science techniques to construct accurate, representative datasets of the US population (Ghenis & Woodruff 2024), reducing deviations from administrative statistics by over 90% (Woodruff 2022a). This forms the foundation for policy simulations and impact analyses that inform decisions on issues of societal importance, such as income inequality, poverty reduction, and economic mobility.
* To make complex policy analysis accessible to a broader audience, we offer multiple ways to interact with our model, including a web application, API, and Python package, recently enhanced with AI-powered explanations (Volk 2024), fostering more inclusive and informed public discourse on critical national issues.

The power of open-source collaboration is crucial to realizing PolicyEngine's full potential. Our active open-source community already includes 50 current developers and over 100 total contributors who enhance our codebase through GitHub. These contributors make substantial technical additions - economists parameterize new tax policies, software developers improve our web interface and API functionality, and data scientists enhance our microsimulation methods. By making our entire codebase and methodology publicly visible, we invite scrutiny and build trust.

An active community of contributors is essential to PolicyEngine's continued growth and improvement. Our open-source ecosystem enables developers to identify and implement enhancements through our well-documented API (Woodruff 2022b) and microsimulation framework (Woodruff 2022c). Recent grants from NEO Philanthropy (Ghenis 2024a) and the Nuffield Foundation (Ghenis 2024b) support our transition to a sustainable organization.

Through this POSE Phase I project, we aim to develop a comprehensive plan for establishing PolicyEngine as a robust OSE, evolving from a project of the Policy Simulation Library Foundation into an independent 501(c)(3) managing organization. This transition will ensure long-term sustainability and maximize our impact on evidence-based policymaking in the United States.

### Risk Analysis/Security Plan

PolicyEngine's OSE faces several key risks we will actively mitigate through: automated testing and code review processes for all external contributions; a secure continuous integration pipeline with branch protection, signed commits, and automated vulnerability scanning following CISA guidelines; robust data privacy controls for sensitive policy data; clear governance processes for maintaining nonpartisan standards; recognition systems for contributor retention; and diversified funding sources for long-term sustainability.

### I-Corps Training

Our team will participate in I-Corps for POSE training to refine our approach. The team includes the PI, our community engagement manager, and an experienced external mentor. Through 100+ stakeholder interviews and workshop participation, we will validate our distributed development model and identify key opportunities for community growth.

Per the POSE Phase I requirement for I-Corps–style training, we have identified Dr. Dan Feenberg as our external mentor. Dr. Feenberg is the creator and longtime steward of TAXSIM, introduced in Feenberg & Coutts (1993) and cited in over 1,100 academic publications. TAXSIM has historically been closed-source, but Dr. Feenberg is now actively collaborating with PolicyEngine to build an open-source emulator that replicates TAXSIM’s input/output interface using PolicyEngine’s rules engine. This approach will enable the National Bureau of Economic Research (NBER) to migrate the backend of TAXSIM to an open-source environment while maintaining continuity for its large user base. Dr. Feenberg is advising on that technical transition and helping ensure accurate cross-validation of state and federal tax rules.

Dr. Feenberg’s role as mentor will include 41 hours of participation in the I-Corps training sessions, offering additional consultation and feedback as needed within that timeframe. His deep experience in economics, software engineering, and academic research makes him exceptionally well-suited to guide our ecosystem discovery—particularly around rigorous validation, data integrity, and bridging academic and open-source communities. He will serve as an independent resource to ensure our strategic decisions and deliverables align with best practices for both policy modeling and open-source community-building.

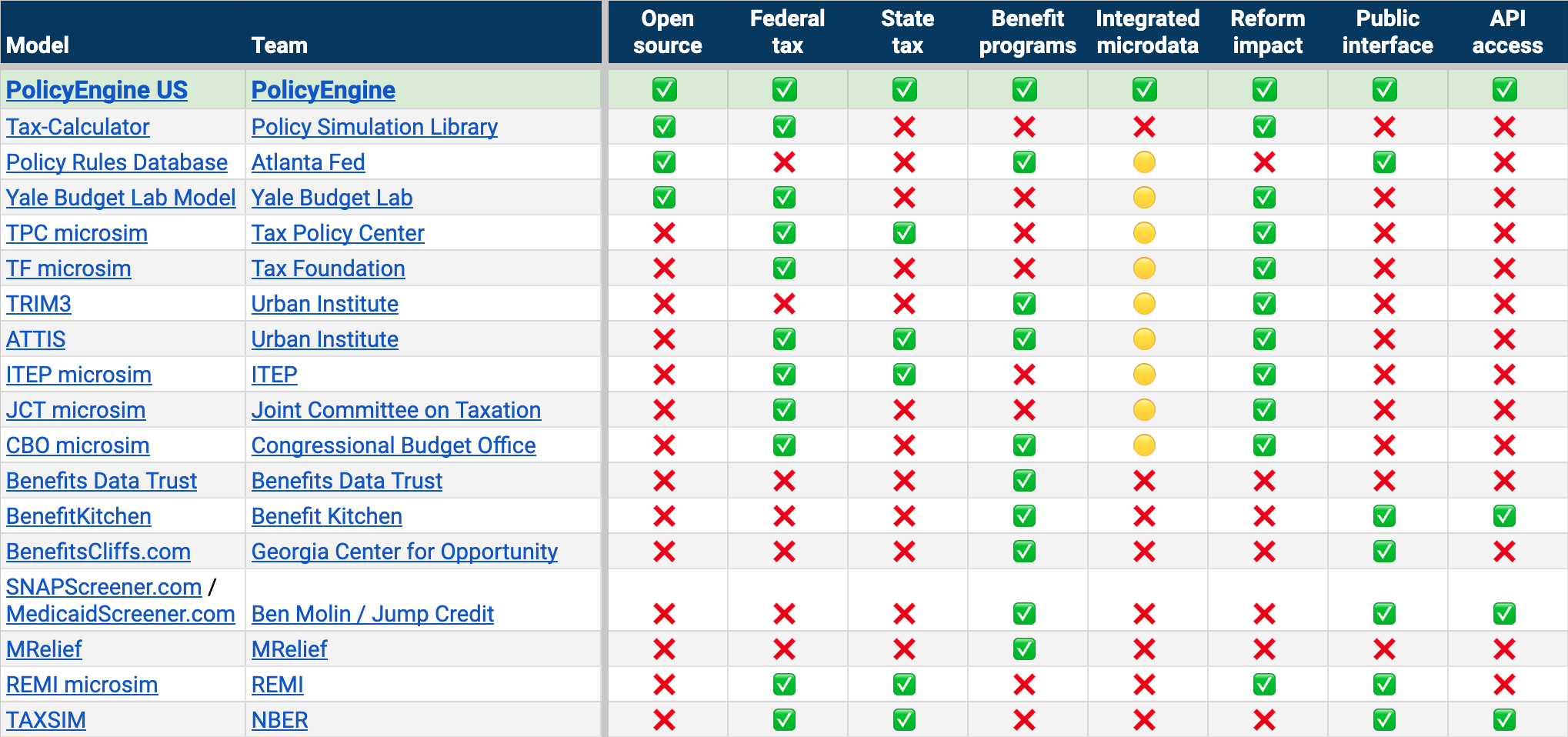
### Intellectual Merit

PolicyEngine advances economic policy analysis by combining precision rule-based software with advanced microsimulation strategies. Our approach yields a uniquely comprehensive and transparent policy analysis tool:

* Comprehensive Modeling: Our model calculates net income and marginal tax rates across complex tax and benefit systems, projecting impacts of policy reforms on poverty, inequality, and budgets. It identifies disparities by demographic factors and flags unintended consequences, providing crucial insights for policymakers and researchers.
* Advanced Computational Methods: We employ quantile regression forests and gradient descent, enabling more accurate simulation of a broader range of policy reforms and capturing intricate interactions between tax and benefit programs. Our recent implementation of behavioral responses (Ghenis et al. 2024; Ahmadi 2024) allows modeling of how policies affect labor supply and other economic behaviors.
* Accessible User Interface: Our mobile-friendly web interface empowers users without coding or economics expertise to model reforms. It includes an AI-powered feature (currently using the Claude API, with exploration of open-source LLMs underway) that generates plain-language explanations of policy impacts.
* Modular Architecture: Our software platform features specialized country packages, a versatile API, and tools for microdata handling. This design facilitates contributions from the open-source community while maintaining national-level modeling accuracy.

As shown in Table 1, PolicyEngine uniquely combines open-source accessibility, comprehensive coverage of taxes and benefits, integrated microdata, reform impact analysis, and both public and API access. This positions PolicyEngine at the forefront of policy analysis tools, offering previously unavailable capabilities in a single, integrated platform. By bridging academic rigor and practical accessibility, PolicyEngine is poised to transform economic policy analysis, enabling more informed, data-driven decision-making across government and society.

**Table 1: Comparison of policy modeling tools.**



### Broader Impacts

PolicyEngine transforms policy research by enabling rapid analysis of complex challenges and facilitating broader communication of results. Our enhanced microdata approach (Ghenis & Woodruff 2024) and machine learning-driven calibration methods (Woodruff 2022a) have established PolicyEngine as a leader in economic microsimulation and benefit access, recognized by both technical experts and policy institutions (Woodruff 2023).

*User Engagement and Impact:* PolicyEngine serves over 5,000 unique monthly users in the US and UK, including prominent think tanks and government agencies like the Centre for Policy Studies, HM Treasury, and Niskanen Center (Ghenis & Gross 2024). Our platform has been used in academic research and presented at major policy conferences, establishing its credibility across multiple sectors.

In addition, our rules engine API powers benefit navigation tools in multiple regions, including Colorado, North Carolina, and Los Angeles County. These tools, documented in our developer guides (Woodruff 2022c), demonstrate a growing commercial ecosystem: the Gates Foundation-supported MyFriendBen (Henson 2024) has used our API since 2023; Benefit Navigator switched from a closed-source competitor to PolicyEngine in 2024 to serve LA County caseworkers under Hilton Foundation support (Imagine LA 2022); and venture-backed companies Impactica and Starlight have committed to adopting our API for their benefit screening products. This growing commercial adoption helps address the $70 billion gap between benefit eligibility and enrollment across major federal entitlement programs (Giannarelli et al. 2023) while building sustainable revenue streams for our OSE.

*Open-Source Community and Development:* Our active open-source community includes 50 current developers and over 100 total contributors. This diverse group, which includes non-technical volunteers, collaborates through various platforms to enhance PolicyEngine's capabilities across multiple domains.

*Funding and Future Capabilities:* Support from funders including the Nuffield and Arnold Foundations is enabling the development of advanced features such as dynamic modeling and granular geographical breakdowns, further expanding PolicyEngine's analytical capabilities.

By nurturing an active open-source community, continuously improving its capabilities, and supporting real-world benefit access tools, PolicyEngine is set to make policy analysis and social support more accessible, comprehensive, and responsive to societal needs.

## Evolving from a Research Tool to an Open-source Ecosystem

PolicyEngine's growth in policy analysis and benefit access necessitates transitioning to an open-source ecosystem (OSE) under an independent 501(c)(3). This evolution will advance transparency through open scrutiny, clarify policy debates by exposing model assumptions, promote integration with other tools and datasets, and enhance responsiveness to community needs.

Our OSE aims to engage diverse stakeholders, including academic and think tank experts, government agencies, non-profit organizations, software developers, journalists, and individual users. This Phase I planning grant will help us gather input from this broad user base, ensuring our OSE meets varied needs in policy analysis and benefit access. We'll explore how to leverage diverse expertise, from academic rigor to on-the-ground benefit access experience, in building a robust ecosystem.

The following sections outline our strategies for ecosystem discovery, governance development, and community engagement, designed to shape an OSE serving our dual goals of democratizing policy analysis and improving benefit access.

### Ecosystem Discovery

PolicyEngine's ecosystem comprises two main groups: intellectual content developers and external users. Intellectual content developers include economic policy researchers, data scientists, software developers, and user interface designers. These professionals, ranging from academic economists to open-source contributors, form the backbone of our development community. External users encompass public sector policymakers, non-profit organizations, journalists, and individuals exploring policy impacts. This diverse user base represents the broad spectrum of stakeholders who benefit from and contribute to PolicyEngine's capabilities.

Our ecosystem discovery process will involve two main steps. First, we will update PolicyEngine's landscape scan of open-source and proprietary microsimulators. Through formal conversations with these organizations, we aim to identify gaps in currently available capabilities, understand unmet user needs, explore potential collaborations, and assess interest in participating in our OSE. This step will help us position PolicyEngine effectively within the existing ecosystem of policy analysis tools.

Second, we will conduct a comprehensive survey of intellectual content developers and external users. This survey will explore current and future microsimulation needs, potential contributions to PolicyEngine's development, barriers to adoption or contribution, and interest in participating in the OSE. We will pay particular attention to engaging diverse stakeholders, including historically underrepresented groups, in policy analysis and benefit access work, to ensure PolicyEngine's continued relevance, accuracy, and utility across various communities.

Our ecosystem discovery will also explore potential collaborations with other open-source projects in the policy analysis space. We already collaborate with the Atlanta Fed Policy Rules Database, MyFriendBen, American Enterprise Institute Tax-Calculator, and Policy Simulation Library. We will investigate deepening these partnerships and explore new collaborations with projects like Yale Budget Lab to strengthen our ecosystem approach and expand our collective impact on policy analysis.

Based on a preliminary analysis of the survey results, we will identify areas requiring deeper exploration through focus groups. These sessions will help us understand how PolicyEngine can best serve as a credible, valid, and nonpartisan tool while meeting the diverse needs of our ecosystem.

The projected timeline for this stage is 4 months, with survey and target list development in the first month, survey administration in the second, analysis in the third, and focus groups in the fourth. This project will be led by the community engagement manager under the supervision of the principal investigator. The insights gained from this ecosystem discovery process will inform our governance structure and community engagement strategies, ensuring PolicyEngine evolves into an OSE that effectively serves both intellectual content developers and external users.

## Organization and Governance

PolicyEngine recognizes the need for a robust governance model anchored in an independent 501(c)(3) managing organization. Our sustainability model combines:

* Philanthropic support aligned with our public good mission of providing free, open-source policy information
* Research contracts and grants to enhance and apply our software to policy-relevant questions
* Development funding from API users to expand our model's capabilities as they enter new geographies or programs
* Usage-based fees for our hosted API infrastructure

We will develop an advisory board that will evolve into a board of trustees as we transition from the Policy Simulation Library Foundation. The 9-11 member board will represent our diverse ecosystem: 3-4 from technology and open-source, 3-4 from policy research and analysis, 2-3 from user organizations, and 1-2 international members.

To ensure ethical considerations and maintain a nonpartisan approach, we will implement a balanced governance structure, tracking usage across the political spectrum and establishing an ethics committee within our Advisory Board.

The governance development process will align with our ecosystem discovery:

* Months 1-3: Develop board recruitment strategy
* Months 4-5: Announce opportunities and solicit nominations
* Months 6-7: Select board members
* Month 8: First in-person advisory board meeting
* Months 9-11: Develop bylaws and procedures
* Month 12: Establish quarterly meeting schedule

The PI will lead this project with support from a special assistant (operations manager), technical program manager, and the community manager, ensuring alignment with PolicyEngine's mission and ecosystem insights.

## Community Building and Engagement

Building and supporting the community of users and contributors is essential to the ongoing vitality, credibility and sustainability of PolicyEngine. The community manager will lead the community building project and coordinate with PolicyEngine’s technology and communications staff to build community engagement resources and programs.

### Community Building

In collaboration with PolicyEngine's technology and communications staff, our community manager will develop a comprehensive community building and engagement strategy focusing on three key segments: policy researchers/analysts, benefit access practitioners, and open-source contributors. Our planning process will involve:

* Analyzing our current user base and contributor network to identify engagement gaps.
* Conducting interviews and focus groups with segment representatives to understand their needs and barriers.
* Researching successful community-building strategies from similar projects.
* Drafting engagement initiatives for each segment. For example, these may include:
  + Policy researchers: Establishing a Collaborative Research Program with academic institutions and think tanks.
  + Benefit access practitioners: Developing a Benefit Access Partners Program for organizations using PolicyEngine in benefit navigation tools.
  + Open-source contributors: Hosting Open Development Sprints and implementing a Contributor Recognition Program.
* Evaluating initiatives based on mission alignment, resources, and potential impact.
* Developing metrics to assess community building effectiveness.

The outcome will be a detailed, flexible community engagement plan with segment-specific strategies, timelines, resource requirements, and success metrics. This roadmap will support PolicyEngine's transition to a sustainable open-source ecosystem.

### Community Engagement

The community engagement manager will develop targeted resources and programs to deepen engagement with both long-time users and contributors, as well as strategies to onboard newcomers to the platform. Our approach will focus on two key groups: users and contributors.

**Users:**

* Interactive Tutorials and FAQs: Develop comprehensive, user-friendly guides to help users navigate PolicyEngine's features and understand policy analysis concepts.
* Webinars and Workshops: Host regular online sessions focusing on policy topics, platform updates, and case studies to showcase PolicyEngine's capabilities and foster user community interaction.
* Expanded User Support: Enhance our Slack workspace to facilitate user discussions, share experiences, and provide timely support for questions and issues.
* Feedback Channels: Implement a structured system for gathering user feedback through surveys, social media monitoring, and direct outreach to continuously improve the platform.
* Government Workshops: Organize targeted sessions for government agencies to demonstrate PolicyEngine's value in policy analysis and decision-making processes.

**Contributors:**

* Open-Source Contribution Guide: Create comprehensive documentation outlining how developers, economists, and other experts can contribute to PolicyEngine's codebase and models.
* Hackathons and Innovation Challenges: Organize events to tackle specific policy modeling challenges, encouraging creative problem-solving and attracting new contributors.
* Regular Virtual Team Meetings: Continue and expand our practice of holding project and organization-level meetings to foster collaboration and align development efforts.
* Recognition System: Implement a structured way to acknowledge contributor achievements, enhancing motivation and community spirit.
* Interdisciplinary Collaboration: Actively engage non-technical volunteers in UX design, communications, social media, sustainability, and strategy discussions to enrich PolicyEngine's development.

Through these targeted efforts, PolicyEngine aims to expand engagement within its existing community while attracting new users and contributors. This approach will foster a collaborative ecosystem that seamlessly combines transparent policy modeling with informed policy analysis, leveraging diverse expertise to enhance PolicyEngine's capabilities and impact.

# Organizational Background

PolicyEngine has established itself as a leader in open-source economic modeling, achieving significant impact with limited resources. We've developed world-class microsimulators for the US and UK on less than $1 million in cash funding, demonstrating our ability to efficiently leverage resources and engage the open-source community.

Our success is amplified through strategic partnerships with organizations such as DemocracyLab, which connects open-source volunteers with social good projects, and the Policy Simulation Library, which promotes open-source projects in public policy. These collaborations have added momentum to our efforts and expanded our development capacity.

PolicyEngine's effectiveness stems from our operational agility and multidisciplinary approach. We seamlessly integrate technology, economics, and policy design, adapting quickly to emerging challenges and technological advancements. Our lean approach is complemented by advanced computational infrastructure, allowing us to deliver sophisticated analyses while maximizing resource efficiency. Our technical infrastructure includes industry-standard tools such as Git for version control, CI/CD pipelines for testing, and GitHub for collaboration, demonstrating our readiness for growth.

This POSE grant offers PolicyEngine the opportunity to evolve from a model predominantly supported by founder contributions and unpaid work to a robust and sustainable NGO. By enhancing our organizational structure and expanding our team, we aim to scale our impact and further democratize access to sophisticated policy analysis tools.

## Measuring and Evaluating Impact

PolicyEngine is committed to maintaining high standards of effectiveness, impact, and transparency in both policy analysis and benefit access. We will track and report quarterly to our board of advisors on the following metrics:

* Model Accuracy and Transparency: We will continuously monitor and publicly report on our model's accuracy, comparing PolicyEngine's outputs with original survey data, official government data, and projections. This comparison will be available to all users and updated in real-time.
* Developer and Contributor Community: We will track the number of issues filed, pull requests made, and the rate and diversity of code contributions, implementing quality metrics such as code review processes and automated testing coverage.
* User Base Metrics: We will monitor user engagement through platform interaction metrics and conduct regular user surveys to gather qualitative data on satisfaction and areas for improvement.
* Academic and Policy Impact: We will track citations of PolicyEngine in academic papers, policy briefs, and governmental reports, and survey researchers and policymakers on PolicyEngine's utility.
* Benefit Access Impact: We will measure the effectiveness of our benefit access tools by tracking:
  + Number of individuals using our benefit navigation tools
  + Estimated increase in benefit uptake resulting from our tools
  + Feedback from case managers and nonprofits using our API for benefit screening
  + Reduction in time required for benefit eligibility determination
* Financial Efficiency: We will perform ongoing cost-benefit analyses for major projects and initiatives.

Biennially, we will conduct a comprehensive review including:

* User and Contributor Feedback: A focused landscape scan to collect high-level feedback on our strategic objectives.
* Organizational Effectiveness: An assessment of our organizational strength by the Board of Directors and Advisory Board, informing a comprehensive strategy review.
* Benefit Access Ecosystem Analysis: An evaluation of our role and impact within the broader benefit access landscape, identifying areas for improvement and expansion.

This approach ensures PolicyEngine remains accountable and aligned with our dual mission of democratizing access to sophisticated policy analysis tools and improving benefit access for those in need.